Three Day Air Toxic Workshop
August 15-17, 2006

California Polytechnic State University (Cal Poly)
And
California Air Resource Board (CARB)

Presents

U.S. Environmental Protection Agency (EPA)
Air Pollution Training Institute (APTI)
Course #401
Sampling and Analysis
For Air Toxics/Hazardous Air Pollutants (HAPs)
Utilizing
EPA's *Compendia* Methodology

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I. Background

Air pollutants have been a subject of interest and concern for many years. With the passage of various United States Clean Air Acts, the federal government developed reference methods (RMs) for sampling and analysis of criteria pollutants (i.e., SO_2, NO_x, O_3, CO, Pb and total suspended particulates) so regulatory decisions could be based on precise and accurate data. However, there were no methods developed for sampling and analyzing of hazardous air pollutants (HAPs).

During the early 1980s, concerns were raised by many people, regional regulatory authorities, and environmentalists that the federal government nor state air quality control agencies were prepared to address the problems posed by air toxics or HAPs in their region. At that time, there was no planned environmental programs for measuring air toxics/HAPs; rather, there were a number of individual unrelated networks or special studies in which a variety of monitoring and analytical techniques were used to obtain results that varied widely in data quality. The absence of standardized procedures raised serious concern about the compatibility of the data collected with its ultimate use.

Ensuring data compatibility is critical because major decisions are based on the interpretation of such data relating to health effect issues and applicable control options. In response to these concerns, many state agencies are now passing their own air toxics/HAPs regulations to address the characterization of air toxics sampling and analyzes as part of a national air toxic remediation program. This action places more responsibility on state air pollution control agencies to keep the public informed about the health effects of various air toxic emissions and levels of exposure to these pollutants.

Consequently, Cal Poly and CARB sees an immediate need to provide training to air quality personnel involving the establishment, sampling and analysis of air toxics/HAPs in the ambient air.

II. Workshop Objectives

The objective of this 3-day workshop is to provide environmental scientist and ambient air monitoring personnel with the needed background information and guidance associated with methodologies involving the sampling and analysis of HAPs. This workshop will address air toxic regulations, developing monitoring plans and protocols,

sampling for volatile organics (specially-treated canisters, multibed adsorbents, cryogenic trapping, and on-line GC monitoring), acid aerosols (annular denuder), semi-volatiles (PUF/XAD-2), and particulate matter (time-integrated and real-time), as illustrated in the attached agenda.

The workshop will present standardized sampling procedures for ambient air monitoring of air toxics/HAPs as outlined in three U.S. Environmental Protection Agencies (EPA's) documents:

- *EPA's Compendium of Methods for Determination of Toxic Organic Compounds in Ambient Air-Second Edition;*
- *EPA's Compendium of Method for Determination of Inorganic Compounds in Ambient Air; and*
- *Quality Control Procedures for Ambient Air Monitoring Utilizing EPA's Compendia Methodology.*

Specifically, this workshop will address the following new recent advance EPA *Compendia* methods:

Organic Compendium-Second Edition

- **Method TO-1A:** Solid Adsorbent Sampling for Volatile Organic Compounds
- **Method TO-9A:** Sampling for Dioxin/Furans
- **Method TO-11A:** Sampling for Formaldehyde and other Carbonyls
- **Method TO-13A:** Sampling for Semi-volatile Organics
- **Method TO-14A:** Sampling for Volatile Organics Using SUMMA Canisters
- **Method TO-15 and Supplement:** Sampling for Volatile Organics Using Special Canisters
- **Method TO-17:** Multi-bed Adsorbent Technology for Sampling Volatile Organics

Inorganic Compendium

- **Method IO-1:** Continuous Real-time Monitoring for PM-10/PM-2.5 in Ambient Air
- **Method IO-2:** Time-integrated Monitoring for PM-10/PM-2.5 in Ambient Air
- **Method IO-4:** Sampling for Atmospheric Acidic and Basic Gases
- **Method IO-5:** Sampling for Atmospheric Mercury

In addition, information will be presented on EPA's monitoring programs associated with the monitoring for enhanced ozone constituents, particulate matter in the PM-10 and PM-2.5 size range, and speciated PM-2.5. The participant will learn how to develop an air monitoring sampling and analysis plan (SAP), QA/QC requirements associated with HAPs ambient air monitoring programs, developing project specific data quality objectives (DQOs), relating sampling and analysis to risk-base agency programs, developing site specific target compound list (TCL) for acceptable ambient air levels

(AALs), and identifying environmental data bases for regulatory use. Finally, several case studies will be presented.

This workshop is intended for state agency personnel, government scientists, field engineers, enforcement project managers, and environmental managers who must: (1) understand the process for selecting and characterizing HAPs in an urban or community setting; (2) develop and implement a HAPs program involving design and operation of sampling methods for trace organics and inorganic constituents as part of regulatory initiatives; and (3) operation of a monitoring network as part of remediation activities at abandoned waste sites.

At the end of this workshop, the students should have an understanding of the unique techniques needed to accurately characterize HAPs in urban air and from Superfund /hazardous waste sites. He will learn about air toxic programs that require HAPs characterization using updated *Compendia* methodologies, know where to find valuable information sources concerning methods, databases, and key contacts within the air toxic program.

III. Workshop Manuals

Presentations and field videos will be supported by two manuals. They are:

- **Student Workbook (Hard Copy):** The Student Workbook contains the course agenda, copies of selected slides from each of the topic areas, homework problems, and timely articles supporting lecture/course objectives.
- **Student Manual (on CD):** The Student Manual contains full copies of selected sampling and analytical methods outlined in EPA's *Organic Compendium-Second Edition* and the *Inorganic Compendium.* In addition, the student manual will contain monitor specific operational checklists to be used by field personnel in the operation of field samplers as part of an agency air toxic program.

In addition, numerous vendor handouts will be provided as part of the student workbook illustrating the sampling tools for characterizing volatile, semi-volatile and particulate matter HAPs in ambient air.

IV. Agenda

The following agenda reflects the emphasis of this course on sampling and analysis of HAPs in ambient air, establishing state agency ambient air air toxic/HAPs monitoring programs, and the operation of those programs through the various sampling techniques presented in EPA's *Compendia* used to characterize HAPs in the community and at hazardous waste sites. The agenda reflects the operation of the various samplers and field operational checklist in the implementation of those samplers as part of a state agency air toxics/HAPs sampling and analytical program.

V. About the Instructor

Mr. Winberry has more than 25 years experience in air toxics monitoring and control evaluation, including more than 20 years of experience and leadership in environmental training. He specializes in ambient monitoring of air toxics, source testing, indoor air pollution sampling and analysis, and policy issues. Using this field experience, he has developed training courses and guidance documents covering air toxics, ambient air monitoring, hazardous waste management and stack testing. In this capacity, Mr. Winberry has given five day training courses involving sampling and analysis of HAPs in the ambient air and stack testing for the Air and Waste Management Association (AWMA), the Hazardous Waste and Hazardous Materials Association (HWHMA), the American Industrial Hygiene Association (AIHA) and the American Chemical Society (ACS). He is presently developing satellite workshops for North Carolina State University (NCSU) on continuous emission monitoring (CEM) and air toxics as part of the U.S. Environmental Protection Agency's (EPA's) Distant Learning Network (DLN). Mr. Winberry has been a faculty member of EPA's Air Pollution Training Institute for more than 20 years. Mr. Winberry developed and is course director for EPA's Course #401 entitled: *Sampling and Analysis for Hazardous Air Pollutants in the Ambient Air*. Mr. Winberry is the principle author of the three course manuals entitled:

- *Compendium of Methods for Determination of Toxic Organic Compounds in Ambient Air-Second Edition, EPA-625/R-96/010b, January 1999;*
- *Compendium of Method for Determination of Inorganic Compounds in Ambient Air, EPA-625/R-96/010a, June 1999; and*
- *Quality Control Procedures for Ambient Air Monitoring Utilizing EPA's Compendia Methodology.*

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Workshop Agenda
Sacramento, CA

Day 1 (Tuesday, August 15, 2006)

8:30 AM **1.** Introduction/ Course Welcome/Opening Comments
- -Review of Course Materials
- -Course Objectives

8:45 **2.** Regulatory Acts Addressing Air Toxics and Hazardous Air Pollutants (HAPs)

9:15 **3.** Defining HAPs

9:30 **BREAK**

9:45 **4.** Sampling for Particulate Matter (TSP/PM_{10}/$PM_{2.5}$/$PM_{10-2.5}$)
- -Time Integrated Methodology (Compendium Method IO-2)
- -Selection of Filter Material
- -Comparison of Time Integrated Methodology
- -Flow Techniques -Mass/Volumetric
- -Analysis of Filters
  - -ICP *(Video- 5 minutes)*
  - -XRF *(Video- 5 minutes)*
- -Monitor Specific Operation Checklist
- -Quality Assurance/Quality Control (QA/QC)

12:00 LUNCH

1:15 **5.** Real-time Continuous PM_{10}/$PM_{2.5}$/$PM_{10-2.5}$
- -Beta Gauge
- -Oscillating Microbalance
- -Real-time
- -Quality Assurance/Quality Control Associated with Particulate Sampling

2:30 BREAK

2:45 **6.** Sampling and Analysis for Volatile Organics Using Compendium Method TO-17, Solid Adsorbent Technology
-Adsorbent Bed Characteristics
-Adsorbent Clean-up
-Setting Up An Adsorbent Network
-Solid Adsorbent Field Operational Checklist

7. Analysis by Thermal Desorption/GC/MS
(Laboratory Video- 15 minutes)
Quality Assurance/Quality Control Associated with Solid Adsorbent Technology

4:30 Review of Day 1/Questions

4:45 Day 1 Adjourn

Day 2 (Wednesday, August 16, 2006)

8:30 Review of Day 1/ Questions/Answers

8:45 **8.** Sampling for Volatile Organics Using Canister Technology (Compendium Method TO-14A/15 and Supplement)
-Canister Design *(Studio Canisters)*
-Canister Certification
-Sampling Methodology (Evacuated/Pump Assist)
(Field Video- 8 minutes)
-Field Operational Monitor Checklist

9:45 **BREAK**

10:00 Canisters (Continued)
-Laboratory Analysis
(Laboratory Video-15 minutes)
-Quality Assurance/Quality Control Associated with Canister Sampling

12:00 **LUNCH**

1:15 PM **9. Sampling and Analysis for Aldehydes and Ketones (Compendium Method TO-11A)**
-Cartridge Design and Certification
-Sampler Design and Certification
-Field Application

-Quality Assurance/Quality Control Associated with Aldehyde and Ketone Sampling

3:00 **BREAK**

3:15 **10.** Automated Sampling and Analysis of Air Toxics
-Instrumentation Description
(ENTECH, XonTech, Mark III, ATD 4000 etc.)
-Operations
(Operation Video- 10 minutes)
-Quality Assurance/Quality Control Associated with Real-time VOC Monitors

4:30 Review of Day 2/Questions

4:45 Day 2 Adjourn

(5:30 - 8:30 PM: Visit to Local Air Toxic Laboratory for Demonstration of Solid Adsorbent and Canister Analysis.)

Day 3 (Thursday, August 17, 2006)

8:30 AM Review of Day 2/ Questions/Answers

8:45 **11.** Sampling for Semi-Volatile Organics, Pesticides, Herbicides and Dioxin/Furans (Compendium Methods TO-4A/TO-9A and TO-13A)
-Adsorbent Selection and Design
-Certification of Adsorbent
-Sampling System Design, Calibration and Operation

9:45 **BREAK**

10:00 Sampling for Semi-Volatiles (Cont'd)
-Typical Data and Interpretation
-Field Operational Monitor Specific Checklist
-Quality Assurance/Quality Control Associated with Semi-Volatile Sampling

12:00 **LUNCH**

1:30 PM **12.** Application of Annular Denuder Technology to Ambient Testing Methodology (Enhanced PM-2.5 Program) (Compendium Method IO-4) *(Studio Samplers)*

3:00 **BREAK**

3:15	**13.** Sampling and Analysis for Atmospheric Mercury (Compendium Method IO-5)
4:00	**14.** Applications of Sampling Methods in Ambient Air and At Superfund Sites -Atlanta Ozone Monitoring Study -Bofors Nobel Superfund Site -Drake Chemical Superfund Site -Brio Superfund Site -McFarland Community Air Monitoring Program
4:45	**15. EPA's National Monitoring Networks** -IMPROVE: Interagency Monitoring of Protected Visual Environments - PAMS: Photochemical Assessment Monitoring Stations -NADP/NTN: National Atmospheric Deposition Program/Network -NAPD/MDN: National Atmospheric Deposition/Mercury -CASTNet: Clean Air Status and Trends Network -AIRMoN: Atmospheric Integrated Research Monitoring Network -GPMP: Gaseous Pollutant Monitoring Program -UATMP: Urban Air Toxic Monitoring Program -NDAMN: National Dioxin/Furan Network -EMPACT: Environmental Monitoring for Public Access and Community Tracking (EMPACT)
5:15	**16.** The HAPs Information Highway and the Internet
5:30	Review of Day 3/Questions and Answers
5:45	Course Adjourn